

Remarks

By way of this Preliminary Amendment, claims 1-4 and 6-8 are pending. Claim 5 has been cancelled, and claims 1-4, 6, and 7 have been amended. New claim 8 has been added. These claim cancellations, amendments, and additions are being made solely for purposes of placing the claims in a format appropriate for U.S. prosecution. Applicants submit that the amendments do not change the scope of the claims as originally filed. Such amendments are therefore made to address formalities in the claim format and are not related to the patentability of the subject matter of the claims. No new matter was added by way of these claim amendments and additions.

Conclusion

Applicants believe that the subject matter of the pending claims is patentable and that the instant application should accordingly be allowed. If the Examiner believes that a conversation with Applicants' attorney would be helpful in expediting prosecution of this application, the Examiner is invited to call the undersigned attorney at (203) 812-6450.

If there are any fees due in connection with the filing of this application, please charge the fees to undersigned's Deposit Account No. 13-3372.

Respectfully submitted,

Dated: December 21, 2004

  
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Amendment to the Specification (Attorney Docket No. LeA 36 197)

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Please amend the specification by inserting this paragraph on page 1, line 1 of the specification following the title:

This application is a 371 of PCT/EP2003/006611, filed June 24, 2003.

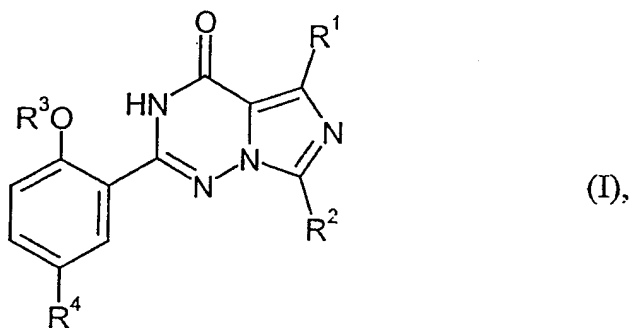
New Claims (Attorney Docket No. LeA 36 197)

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8. (New) A method for improving perception, concentration, learning and/or memory comprising administering to a subject an effective amount of a compound of any one of claims 1 to 4

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 DT01 Rec'd PCT/PTC 22 DEC 2004

1. (Currently amended) A method for the prophylaxis and/or treatment of disorders associated with cGMP-regulated processes or cGMP-related diseases comprising administering to a subject an effective amount of a compound of formula (I) The use of compounds of the general formula (I)



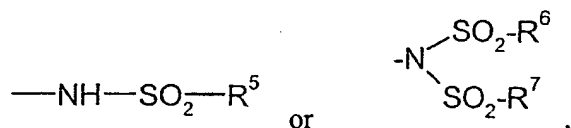
in which

R<sup>1</sup> is (C<sub>1</sub>-C<sub>6</sub>)-alkyl,

R<sup>2</sup> is (C<sub>3</sub>-C<sub>8</sub>)-cycloalkyl or (C<sub>1</sub>-C<sub>12</sub>)-alkyl,

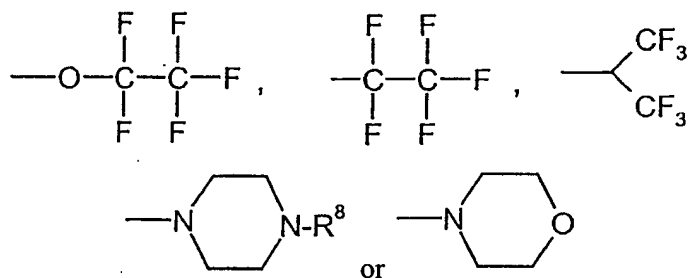
R<sup>3</sup> is (C<sub>1</sub>-C<sub>6</sub>)-alkyl,

R<sup>4</sup> is a radical of the formulae



in which

R<sup>5</sup>, R<sup>6</sup> and R<sup>7</sup> are identical or different and are vinyl or (C<sub>1</sub>-C<sub>6</sub>)-alkyl which is optionally substituted up to 3 times, identically or differently, by trifluoromethyl, halogen, (C<sub>1</sub>-C<sub>6</sub>)-alkoxy or by radicals of the formulae



in which

$R^8$  is hydrogen or  $(C_1-C_4)$ -alkyl,

or

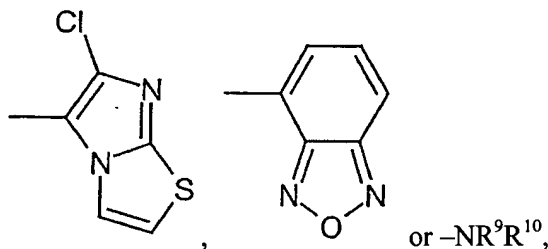
$R^5$ ,  $R^6$  and/or  $R^7$  are  $(C_6-C_{12})$ -aryl which is optionally substituted up to 3 times, identically or differently, by halogen, trifluoromethyl, nitro, cyano, carboxyl,  $(C_1-C_6)$ -alkyl or  $(C_1-C_6)$ -alkoxy,

or

$R^5$  is quinolyl or a 5- to 6-membered, aromatic or saturated heterocycle having up to 3 heteroatoms from the series S, N and/or O, which may optionally be substituted, in the case of an N function also via the latter, up to 3 times, identically or differently, by halogen or  $(C_1-C_6)$ -alkyl,

or

$R^5$  is a radical of the formulae

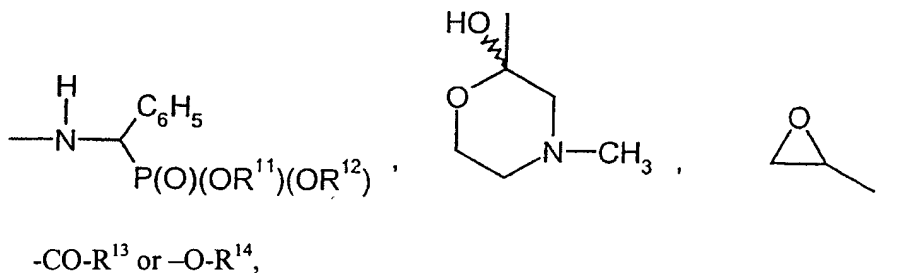


in which

$R^9$  and  $R^{10}$  are identical or different and are hydrogen,  $(C_1-C_6)$ -alkyl or phenyl,

or

$R^4$  is carboxyl or is a radical of the formulae



in which

$R^{11}$  and  $R^{12}$  are identical or different and are hydrogen or (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

$R^{13}$  is (C<sub>1</sub>-C<sub>6</sub>)-alkyl,

$R^{14}$  is (C<sub>1</sub>-C<sub>6</sub>)-alkyl which is optionally substituted up to 3 times, identically or differently, by hydroxyl, phenyl or by a radical of the formula  $-NR^{15}R^{16}$ ,

in which

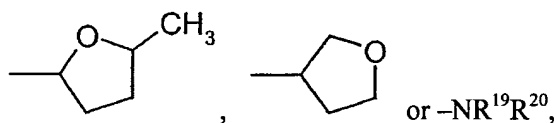
$R^{15}$  and  $R^{16}$  are identical or different and are hydrogen, phenyl or (C<sub>1</sub>-C<sub>4</sub>)-alkyl which in turn may be substituted by phenyl,

or

$R^4$  is a radical of the formula  $-NH-CO-NR^{17}R^{18}$ ,

in which

$R^{17}$  and  $R^{18}$  are identical or different and are hydrogen or (C<sub>1</sub>-C<sub>6</sub>)-alkyl which is optionally substituted by hydroxyl or by a radical of the formulae

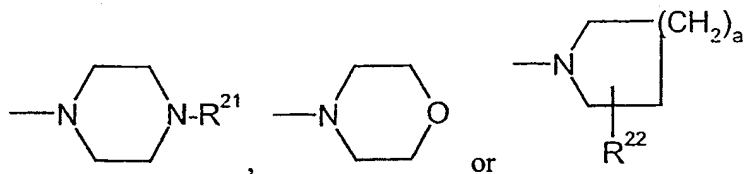


in which

$R^{19}$  and  $R^{20}$  are identical or different and are hydrogen, phenyl or (C<sub>1</sub>-C<sub>6</sub>)-alkyl,

or

$R^{17}$  and  $R^{18}$  form together with the nitrogen atom to which they are bonded a heterocyclic ring of the formulae



in which

$R^{21}$  is hydrogen or (C<sub>1</sub>-C<sub>6</sub>)-alkyl,

a is either 1 or 2,

$R^{22}$  is hydroxyl or  $(C_1-C_6)$ -alkyl which is optionally substituted by hydroxyl,

or

$R^{17}$  and/or  $R^{18}$  are  $(C_6-C_{12})$ -aryl which is optionally substituted by halogen, trifluoroethyl or by  $-SCF_3$ ,

or

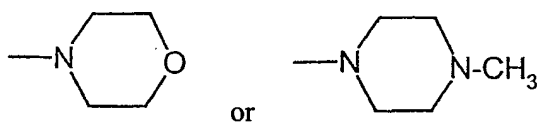
$R^{17}$  is hydrogen and

$R^{18}$  is a radical of the formula  $-SO_2-R^{23}$ ,

in which

$R^{23}$  is  $(C_1-C_6)$ -alkyl or  $(C_6-C_{12})$ -aryl which is optionally substituted by halogen,

or is a radical of the formulae



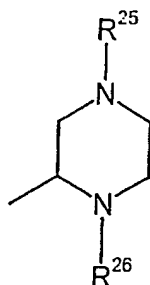
or

$R^4$  is a radical of the formula

$-NH-CO-R^{24}$ ,

in which

$R^{24}$  is a radical of the formula



in which

$R^{25}$  and  $R^{26}$  are identical or different and are hydrogen,  $(C_1-C_6)$ -alkyl or  $(C_1-C_6)$ -alkoxycarbonyl,

or

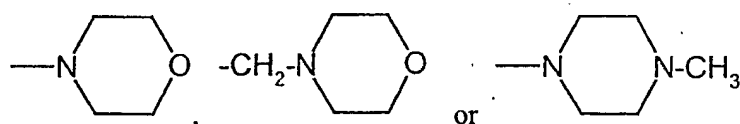
$R^{24}$  is  $(C_1-C_6)$ -alkyl which is optionally substituted by  $(C_6-C_{12})$ -aryl which in turn may be substituted by hydroxyl or  $(C_1-C_6)$ -alkoxy or

$(C_1-C_6)$ -alkyl is optionally substituted by a radical of the formula  $-(SO_2)_b-R^{27}$ ,

in which

b is either 0 or 1, and

$R^{27}$  is a radical of the formulae



or

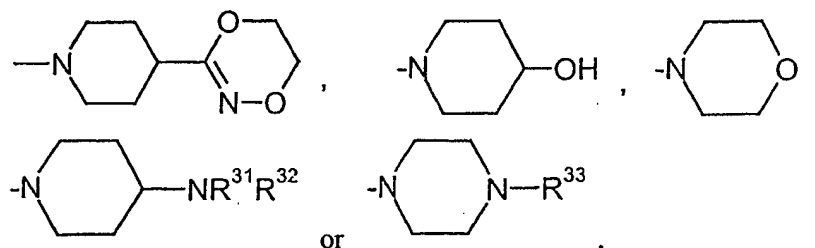
$R^4$  is  $(C_1-C_{12})$ -alkyl which is optionally substituted up to 3 times, identically or differently, by hydroxyl, azide, phenyl or by radicals of the formulae  $-\text{NR}^{28}\text{R}^{29}$ ,  $-\text{O---CO---R}^{30}$  or  $-\text{P(O)}\{\text{O---}[(C_1-C_6)\text{-alkyl}]\}_2$ ,

in which

$R^{28}$  and  $R^{29}$  are identical or different, are hydrogen, phenyl or  $(C_1-C_6)$ -alkyl which is optionally substituted by hydroxyl,  $(C_1-C_6)$ -alkoxy or phenyl,

or

$R^{28}$  and  $R^{29}$  form together with the nitrogen atom to which they are bonded a heterocyclic ring of the formulae





in which

$R^{31}$  and  $R^{32}$  are identical or different and are hydrogen or (C<sub>1</sub>-C<sub>6</sub>)-alkyl,

$R^{33}$  is (C<sub>1</sub>-C<sub>6</sub>)-alkyl, benzyl, (C<sub>1</sub>-C<sub>6</sub>)-alkoxycarbonyl, (C<sub>1</sub>-C<sub>6</sub>)-alkylcarbonyl, carboxyl, pyridyl, pyrimidyl or phenyl which is optionally substituted by (C<sub>1</sub>-C<sub>6</sub>)-alkoxy,

and

$R^{30}$  is (C<sub>1</sub>-C<sub>6</sub>)-alkyl,

or

(C<sub>1</sub>-C<sub>12</sub>)-alkyl is optionally substituted by triazolyl which may in turn be substituted up to twice, identically or differently, by halogen, phenyl, tetrahydrofuranyl, tetrahydropyranyl, (C<sub>1</sub>-C<sub>6</sub>)-alkoxycarbonyl, aminocarbonyl or by (C<sub>1</sub>-C<sub>6</sub>)-alkyl, where the latter can optionally be substituted by hydroxyl, (C<sub>1</sub>-C<sub>6</sub>)-alkoxy or by a radical of the formulae  $NR^{34}R^{35}$  or  $-O-CO-R^{36}$ ,

in which

$R^{34}$  and  $R^{35}$  are identical or different and are hydrogen or (C<sub>1</sub>-C<sub>6</sub>)-alkyl,

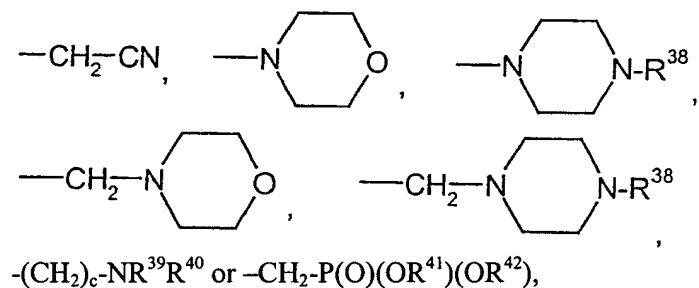
$R^{36}$  is (C<sub>1</sub>-C<sub>6</sub>)-alkyl,

or

$R^4$  is a radical of the formula  $-CO-R^{37}$ ,

in which

$R^{37}$  is a radical of the formulae



in which

$R^{38}$  is hydrogen or (C<sub>1</sub>-C<sub>6</sub>)-alkyl,

c is either 0 or 1,

$R^{39}$  and  $R^{40}$  are identical or different and are hydrogen or  $(C_1-C_6)$ -alkyl, which is optionally substituted by hydroxyl,

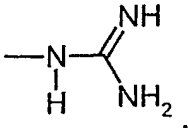
$R^{41}$  and  $R^{42}$  are identical or different and are  $(C_1-C_6)$ -alkyl,

or

$R^4$  is a 5-membered heterocycle having up to 3 heteroatoms from the series S, N and/or O which is optionally substituted, in the case of an N function also via the latter, a total of up to 3 times, identically or differently, by halogen, trifluoromethyl or by phenyl which may in turn be substituted one or more times by halogen or trifluoromethyl,

and/or is optionally substituted by  $(C_3-C_6)$ -cycloalkyl, pyrrol or  $(C_1-C_{12})$ -alkyl which may in turn be substituted by cyano, trifluoromethyl,  $(C_1-C_6)$ -alkoxycarbonyl,  $(C_1-C_6)$ -alkoxy, amino or by phenyl or nitro-substituted phenyl,

and/or may optionally be substituted by  $-NR^{43}R^{44}$ ,  $-NH-CO-CO-R^{45}$ ,  $-NH-CO-R^{46}$ ,  $-NH-CO-$

$CH_2-R^{47}$ ,  $-CO-R^{48}$  or ,

in which

$R^{43}$  and  $R^{44}$  are identical or different and are hydrogen, benzyl  $(C_1-C_6)$ -alkyl or phenyl which is optionally substituted by halogen or trifluoromethyl,

$R^{45}$  is  $(C_1-C_6)$ -alkoxy,

$R^{46}$  is  $(C_1-C_6)$ -alkyl or phenyl,

$R^{47}$  is hydroxyl,  $(C_1-C_6)$ -alkoxy or a radical of the formula  $-O-CO-R^{49}$ ,

in which

$R^{49}$  is  $(C_1-C_4)$ -alkyl,

$R^{48}$  is a radical of the formula  $-CH_2-CN$  or phenyl which is optionally substituted by halogen, trifluoromethyl or  $(C_1-C_6)$ -alkoxy,

and the salts, tautomers, N-oxides, prodrugs and hydrates thereof, and isomeric forms,

for the prophylaxis and/or treatment of disorders associated with eGMP-regulated processes (eGMP-related diseases).

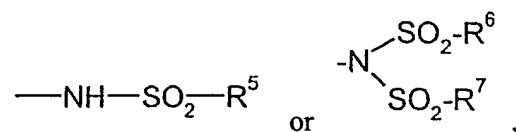
2. (Currently amended) The ~~use method~~ as claimed in claim 1, ~~where-in~~ wherein the compounds of the ~~general~~ formula (I) in which

$R^1$  is (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

$R^2$  is cyclopentyl, cycloheptyl or (C<sub>1</sub>-C<sub>10</sub>)-alkyl,

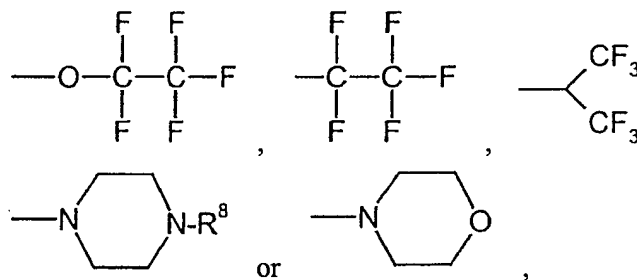
$R^3$  is (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

$R^4$  is a radical of the formulae



in which

$R^5$ ,  $R^6$  and  $R^7$  are identical or different and are vinyl or (C<sub>1</sub>-C<sub>4</sub>)-alkyl which is optionally substituted up to 3 times, identically or differently, by trifluoromethyl, chlorine, (C<sub>1</sub>-C<sub>4</sub>)-alkoxy or by radicals of the formulae



in which

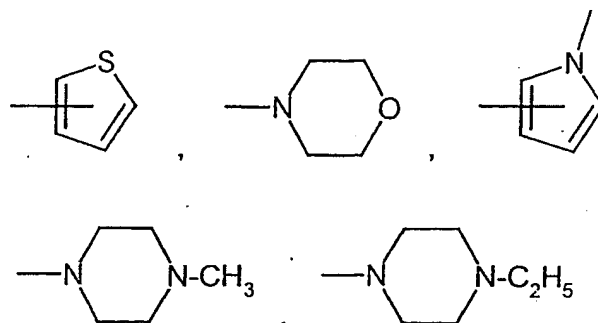
$R^8$  is hydrogen, methyl or ethyl,

or

$R^5$ ,  $R^6$  and/or  $R^7$  are phenyl which is optionally substituted up to 3 times, identically or differently by halogen, trifluoromethyl, nitro, cyano, carboxyl, (C<sub>1</sub>-C<sub>4</sub>)-alkyl or (C<sub>1</sub>-C<sub>4</sub>)-alkoxy,

or

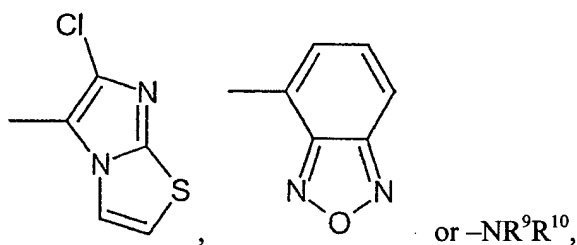
$R^5$  is quinolyl or a radical of the formulae



which may optionally be substituted up to twice, identically or differently, by chlorine or (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

or

R<sup>5</sup> is a radical of the formulae

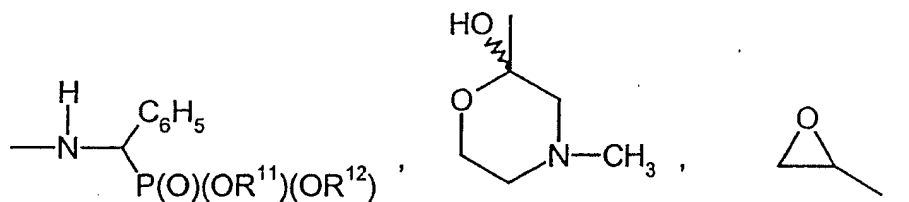


in which

R<sup>9</sup> and R<sup>10</sup> are identical or different and are hydrogen, (C<sub>1</sub>-C<sub>6</sub>)-alkyl or phenyl,

or

R<sup>4</sup> is carboxyl or is a radical of the formulae



-CO-R<sup>13</sup> or -O-R<sup>14</sup>,

in which

R<sup>11</sup> and R<sup>12</sup> are identical or different and are hydrogen or (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

R<sup>13</sup> is (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

$R^{14}$  is (C<sub>1</sub>-C<sub>4</sub>)-alkyl which is optionally substituted up to 3 times, identically or differently, by hydroxyl, phenyl or by a radical of the formula  $-NR^{15}R^{16}$ ,

in which

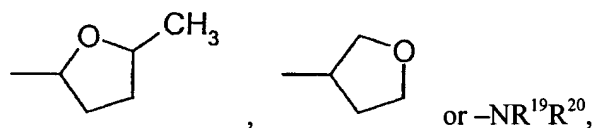
$R^{15}$  and  $R^{16}$  are identical or different and are hydrogen, phenyl or (C<sub>1</sub>-C<sub>4</sub>)-alkyl which may in turn be substituted by phenyl,

or

$R^4$  is a radical of the formula  $-NH-CO-NR^{17}R^{18}$ ,

in which

$R^{17}$  and  $R^{18}$  are identical or different and are hydrogen or (C<sub>1</sub>-C<sub>4</sub>)-alkyl which is optionally substituted by hydroxyl or by a radical of the formulae

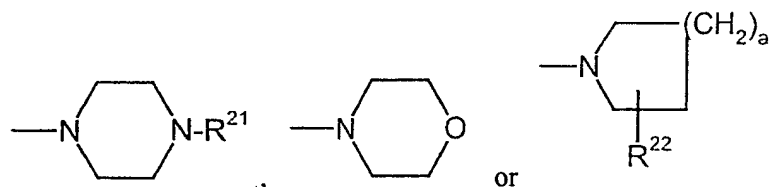


in which

$R^{19}$  and  $R^{20}$  are identical or different and are hydrogen, phenyl or (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

or

$R^{17}$  and  $R^{18}$  form together with the nitrogen atom to which they are bonded a heterocyclic ring of the formulae



in which

$R^{21}$  is hydrogen or (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

$a$  is either 1 or 2,

$R^{22}$  is hydroxyl or (C<sub>1</sub>-C<sub>4</sub>)-alkyl which is optionally substituted by hydroxyl,

or

$R^{17}$  and/or  $R^{18}$  are phenyl which is optionally substituted by chlorine, trifluoroethyl or by  $-\text{SCF}_3$ ,

or

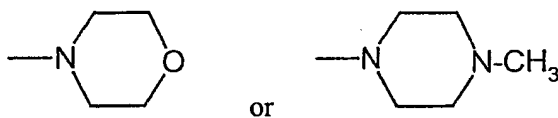
$R^{17}$  is hydrogen, and

$R^{18}$  is a radical of the formula  $-\text{SO}_2\text{-}R^{23}$ ,

in which

$R^{23}$  is  $(\text{C}_1\text{-C}_4)$ -alkyl or phenyl which is optionally substituted by halogen,

or is a radical of the formulae



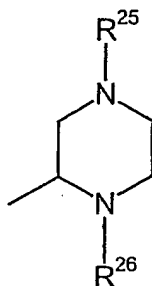
or

$R^4$  is a radical of the formula

$-\text{NH-CO-R}^{24}$

in which

$R^{24}$  is a radical of the formula



in which

$R^{25}$  and  $R^{26}$  are identical or different and are hydrogen,  $(\text{C}_1\text{-C}_4)$ -alkyl or  $(\text{C}_1\text{-C}_4)$ -alkoxycarbonyl,

or

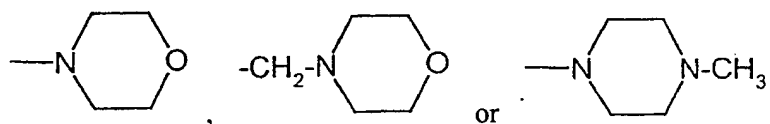
$R^{24}$  is (C<sub>1</sub>-C<sub>4</sub>)-alkyl which is optionally substituted by phenyl which may in turn be substituted by hydroxyl or (C<sub>1</sub>-C<sub>4</sub>)-alkoxy, or

(C<sub>1</sub>-C<sub>4</sub>)-alkyl is optionally substituted by a radical of the formula  $-(SO_2)_b-R^{27}$

in which

b is either 0 or 1, and

$R^{27}$  is a radical of the formulae



or

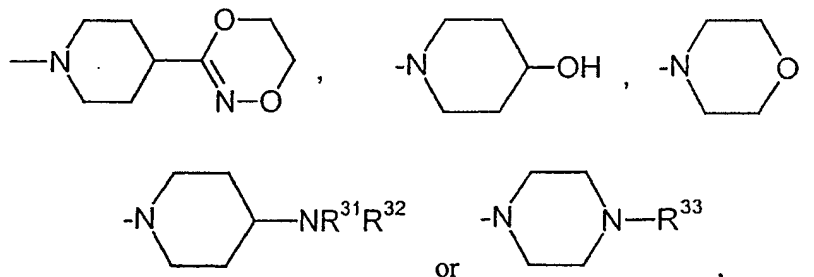
$R^4$  is (C<sub>1</sub>-C<sub>11</sub>)-alkyl which is optionally substituted up to 3 times, identically or differently, by hydroxyl, azide, phenyl or by radicals of the formulae  $-NR^{28}R^{29}$ ,  $-O-CO-R^{30}$  or  $-P(O)\{O-[(C_1-C_6)\text{-alkyl}]\}_2$ ,

in which

$R^{28}$  and  $R^{29}$  are identical or different and are hydrogen, phenyl or (C<sub>1</sub>-C<sub>4</sub>)-alkyl which is optionally substituted by hydroxyl, (C<sub>1</sub>-C<sub>4</sub>)-alkoxy or phenyl,

or

$R^{28}$  and  $R^{29}$  form together with the nitrogen atom to which they are bonded a heterocyclic ring of the formulae



in which

$R^{31}$  and  $R^{32}$  are identical or different and are hydrogen or (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

$R^{33}$  is (C<sub>1</sub>-C<sub>4</sub>)-alkyl, benzyl, (C<sub>1</sub>-C<sub>4</sub>)-alkoxycarbonyl, (C<sub>1</sub>-C<sub>4</sub>)-alkylcarbonyl, carboxyl, pyridyl, pyrimidyl or phenyl which is optionally substituted by (C<sub>1</sub>-C<sub>4</sub>)-alkoxy,

and

$R^{30}$  is (C<sub>1</sub>-C<sub>6</sub>)-alkyl,

or

(C<sub>1</sub>-C<sub>11</sub>)-alkyl is optionally substituted by triazolyl which may in turn be substituted up to twice, identically or differently, by halogen, phenyl, tetrahydrofuranyl, tetrahydropyranyl, (C<sub>1</sub>-C<sub>4</sub>)-alkoxycarbonyl, aminocarbonyl or by (C<sub>1</sub>-C<sub>4</sub>)-alkyl, where the latter may optionally be substituted by hydroxyl, (C<sub>1</sub>-C<sub>4</sub>)-alkoxy or by a radical of the formulae  $NR^{34}R^{35}$  or  $-O-CO-R^{36}$ ,

in which

$R^{34}$  and  $R^{35}$  are identical or different and are hydrogen or (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

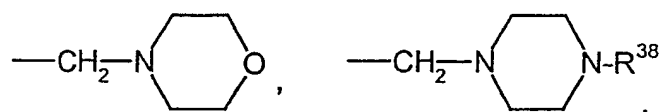
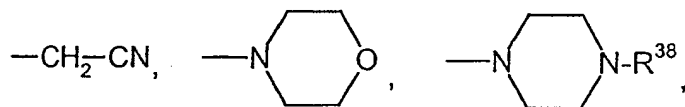
$R^{36}$  is (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

or

$R^4$  is a radical of the formula  $-CO-R^{37}$

in which

$R^{37}$  is a radical of the formulae



$-(CH_2)_c-NR^{39}R^{40}$  or  $-CH_2-P(O)(OR^{41})(OR^{42})$ ,

in which

$R^{38}$  is hydrogen or (C<sub>1</sub>-C<sub>4</sub>)-alkyl,



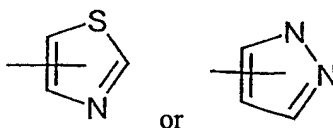
c is either 0 or 1,

$R^{39}$  and  $R^{40}$  are identical or different and are hydrogen or (C<sub>1</sub>-C<sub>4</sub>)-alkyl which is optionally substituted by hydroxyl,

$R^{41}$  and  $R^{42}$  are identical or different and are (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

or

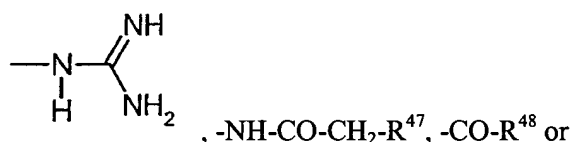
$R^4$  is a radical of the formula



which is optionally substituted, in the case of pyrazole also via the N function, a total of up to 3 times, identically or differently, by chlorine, trifluoromethyl or by phenyl which may in turn be substituted one or more times by chlorine or trifluoromethyl,

and/or is optionally substituted by cyclopentyl, cyclohexyl, pyrrol or (C<sub>1</sub>-C<sub>12</sub>)-alkyl which may in turn be substituted by cyano, trifluoromethyl, (C<sub>1</sub>-C<sub>4</sub>)-alkoxycarbonyl, (C<sub>1</sub>-C<sub>4</sub>)-alkoxy, amino or by phenyl or nitro-substituted phenyl,

and/or may also be substituted by  $-NR^{43}R^{44}$ ,  $-NH-CO-CO-R^{45}$ ,  $-NH-CO-R^{46}$ ,



in which

$R^{43}$  and  $R^{44}$  are identical or different and are hydrogen, benzyl, (C<sub>1</sub>-C<sub>4</sub>)-alkyl or phenyl which is optionally substituted by halogen or trifluoromethyl,

$R^{45}$  is (C<sub>1</sub>-C<sub>5</sub>)-alkoxy,

$R^{46}$  is (C<sub>1</sub>-C<sub>5</sub>)-alkyl or phenyl,

$R^{47}$  is hydroxyl, (C<sub>1</sub>-C<sub>4</sub>)-alkoxy or a radical of the formula  $-O-CO-R^{49}$ ,

in which

$R^{49}$  is (C<sub>1</sub>-C<sub>3</sub>)-alkyl,

$R^{48}$  is a radical of the formula  $-\text{CH}_2\text{-CN}$  or phenyl which is optionally substituted by chlorine, trifluoromethyl or (C<sub>1</sub>-C<sub>4</sub>)-alkoxy,

and the tautomers thereof, and the pharmaceutically acceptable salts, hydrates and prodrugs thereof.

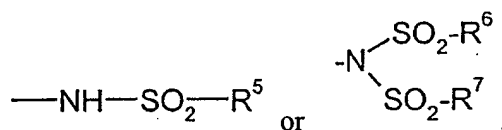
3. (Currently amended) The use method as claimed in claim 1, ~~where in~~ wherein the compound of the general-formula (I)  
in which

$R^1$  is (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

$R^2$  is cyclopentyl, cyclohexyl, cycloheptyl or (C<sub>1</sub>-C<sub>10</sub>)-alkyl,

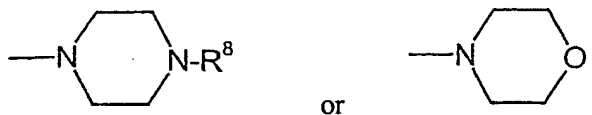
$R^3$  is (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

$R^4$  is a radical of the formulae



in which

$R^5$ ,  $R^6$  and  $R^7$  are identical or different and are vinyl or (C<sub>1</sub>-C<sub>4</sub>)-alkyl which is optionally substituted up to 3 times, identically or differently, by trifluoromethyl, chlorine, (C<sub>1</sub>-C<sub>4</sub>)-alkoxy or by radicals of the formulae



in which

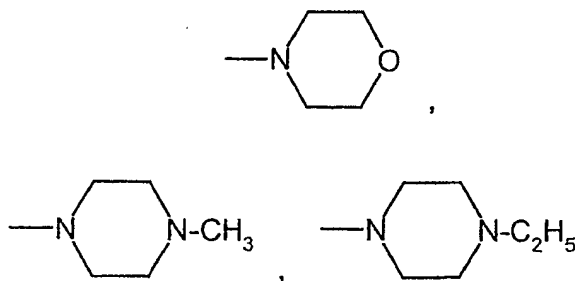
$R^8$  is hydrogen, methyl or ethyl,

or

$R^5$ ,  $R^6$  and/or  $R^7$  are phenyl which is optionally substituted up to 3 times, identically or differently, by halogen, cyano, (C<sub>1</sub>-C<sub>4</sub>)-alkyl or (C<sub>1</sub>-C<sub>4</sub>)-alkoxy,

or

$R^5$  is a radical of the formulae



which may optionally be substituted up to twice, identically or differently, by chlorine or (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

or

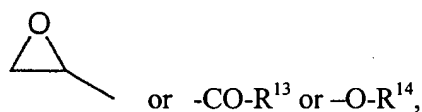
$R^5$  is a radical of the formula  $-NR^9R^{10}$ ,

in which

$R^9$  and  $R^{10}$  are identical or different and are hydrogen, (C<sub>1</sub>-C<sub>4</sub>)-alkyl or phenyl,

or

$R^4$  is carboxyl or is a radical of the formulae



in which

$R^{13}$  is (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

$R^{14}$  is (C<sub>1</sub>-C<sub>4</sub>)-alkyl which is optionally substituted up to 3 times, identically or differently, by hydroxyl or by a radical of the formula  $-NR^{15}R^{16}$ ,

in which

$R^{15}$  and  $R^{16}$  are identical or different and are hydrogen or (C<sub>1</sub>-C<sub>4</sub>)-alkyl which in turn may be substituted by phenyl,

or

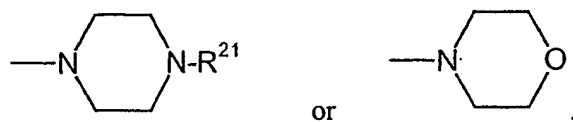
$R^4$  is a radical of the formula  $-NH-CO-NR^{17}R^{18}$ ,

in which

$R^{17}$  and  $R^{18}$  are identical or different and are hydrogen or (C<sub>1</sub>-C<sub>4</sub>)-alkyl which is optionally substituted by hydroxyl,

or

$R^{17}$  and  $R^{18}$  form together with the nitrogen atom to which they are bonded a heterocyclic ring of the formulae



in which

$R^{21}$  is hydrogen or (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

or

$R^{17}$  and/or  $R^{18}$  are phenyl which is optionally substituted by chlorine, trifluoroethyl or by  $-SCF_3$ ,

or

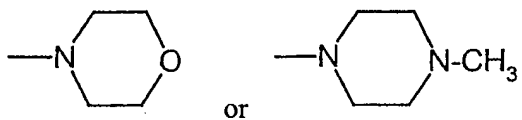
$R^{17}$  is hydrogen, and

$R^{18}$  is a radical of the formula  $-SO_2-R^{23}$ ,

in which

$R^{23}$  is (C<sub>1</sub>-C<sub>4</sub>)-alkyl or phenyl which is optionally substituted by halogen,

or is a radical of the formulae



or

$R^4$  is a radical of the formula

$-NH-CO-R^{24}$ ,

in which

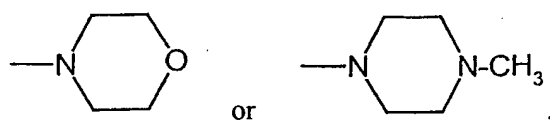
$R^{24}$  is (C<sub>1</sub>-C<sub>4</sub>)-alkyl which is optionally substituted by phenyl which in turn may optionally be substituted by hydroxyl or (C<sub>1</sub>-C<sub>4</sub>)-alkoxy, or

(C<sub>1</sub>-C<sub>4</sub>)-alkyl is optionally substituted by a radical of the formula  $-(SO_2)_b-R^{27}$ ,

in which

b is either 0 or 1, and

$R^{27}$  is a radical of the formulae



or

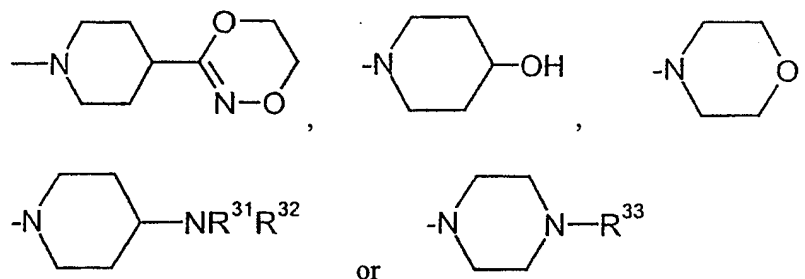
$R^4$  is (C<sub>1</sub>-C<sub>6</sub>)-alkyl which is optionally substituted up to 3 times, identically or differently, by hydroxyl, phenyl or by radicals of the formulae  $-NR^{28}R^{29}$  or  $-O-CO-R^{30}$ ,

in which

$R^{28}$  and  $R^{29}$  are identical or different, are hydrogen, phenyl or (C<sub>1</sub>-C<sub>4</sub>)-alkyl which is optionally substituted by hydroxyl, (C<sub>1</sub>-C<sub>4</sub>)-alkoxy or phenyl,

or

$R^{28}$  and  $R^{29}$  form together with the nitrogen atom to which they are bonded a heterocyclic ring of the formulae



in which

$R^{31}$  and  $R^{32}$  are identical or different and are hydrogen or (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

$R^{33}$  is (C<sub>1</sub>-C<sub>4</sub>)-alkyl, benzyl, (C<sub>1</sub>-C<sub>4</sub>)-alkoxycarbonyl, (C<sub>1</sub>-C<sub>4</sub>)-alkylcarbonyl, carboxyl, pyridyl, pyrimidyl or phenyl which is optionally substituted by (C<sub>1</sub>-C<sub>4</sub>)-alkoxy,

and

$R^{30}$  is (C<sub>1</sub>-C<sub>6</sub>)-alkyl,

or

(C<sub>1</sub>-C<sub>6</sub>)-alkyl is optionally substituted by triazolyl which may in turn be substituted up to twice, identically or differently, by (C<sub>1</sub>-C<sub>4</sub>)-alkyl, where the latter may optionally be substituted by hydroxyl or (C<sub>1</sub>-C<sub>4</sub>)-alkoxy,

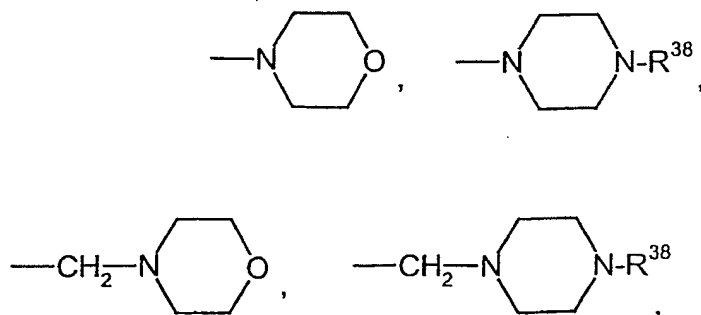
in which

or

$R^4$  is a radical of the formula  $-\text{CO}-R^{37}$ ,

in which

$R^{37}$  is a radical of the formulae



or  $-(\text{CH}_2)_c-\text{NR}^{39}\text{R}^{40}$ ,

in which

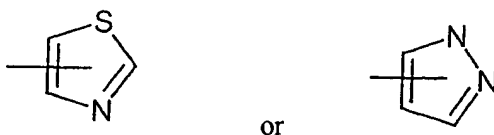
$R^{38}$  is hydrogen or (C<sub>1</sub>-C<sub>4</sub>)-alkyl,

$c$  is either 0 or 1,

$R^{39}$  and  $R^{40}$  are identical or different and are hydrogen or (C<sub>1</sub>-C<sub>4</sub>)-alkyl which is optionally substituted by hydroxyl,

or

$R^4$  is a radical of the formula



which is optionally substituted, in the case of pyrazole also via the N function, a total of up to 3 times, identically or differently, by trifluoromethyl or by phenyl which may in turn be substituted one or more times by chlorine or trifluoromethyl,

and/or is optionally substituted by cyclopentyl, cyclohexyl or by  $(C_1-C_6)$ -alkyl which may in turn be substituted by  $(C_1-C_4)$ -alkoxy, amino or by phenyl,

and/or may optionally be substituted by  $-NR^{43}R^{44}$ ,  $-NH-CO-R^{46}$ ,  $-NH-CO-CH_2-R^{47}$  or  $-CO-R^{48}$ ,

in which

$R^{43}$  and  $R^{44}$  are identical or different and are hydrogen, benzyl,  $(C_1-C_4)$ -alkyl or phenyl which is optionally substituted by halogen or trifluoromethyl,

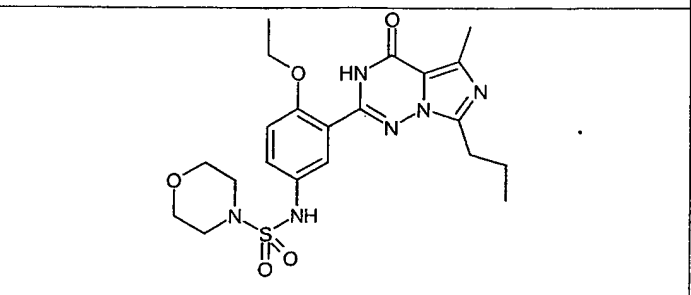
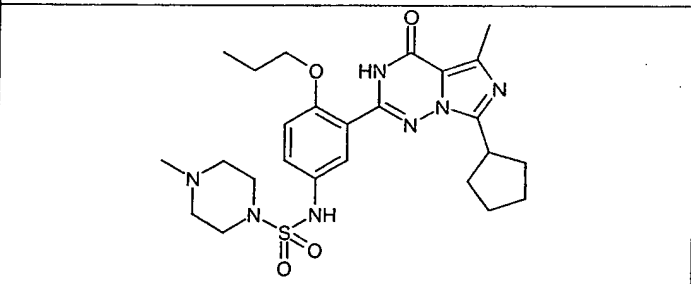
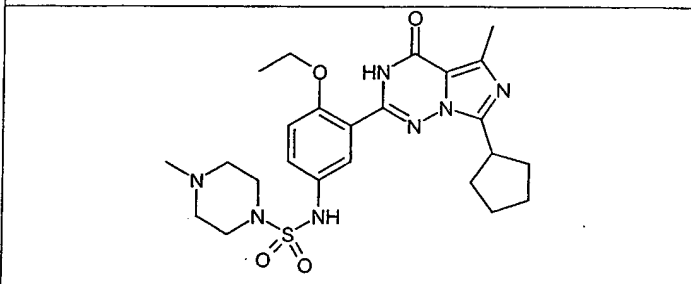
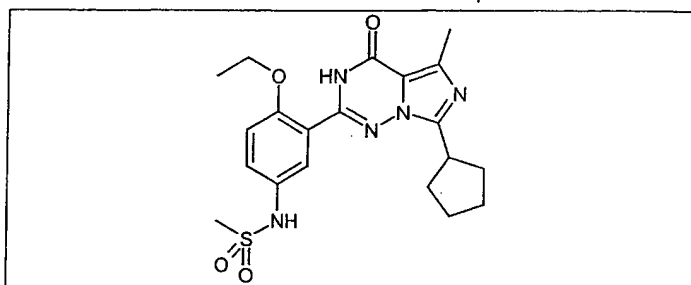
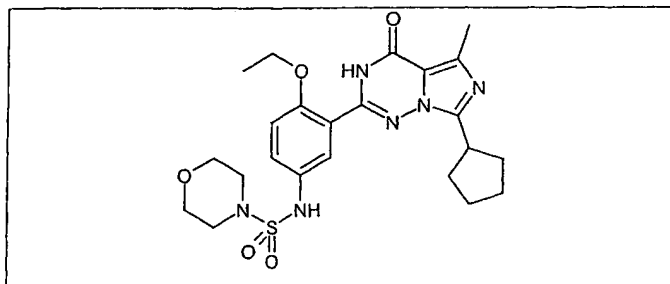
$R^{46}$  is  $(C_1-C_4)$ -alkyl or phenyl,

$R^{47}$  is hydroxyl or  $(C_1-C_4)$ -alkoxy,

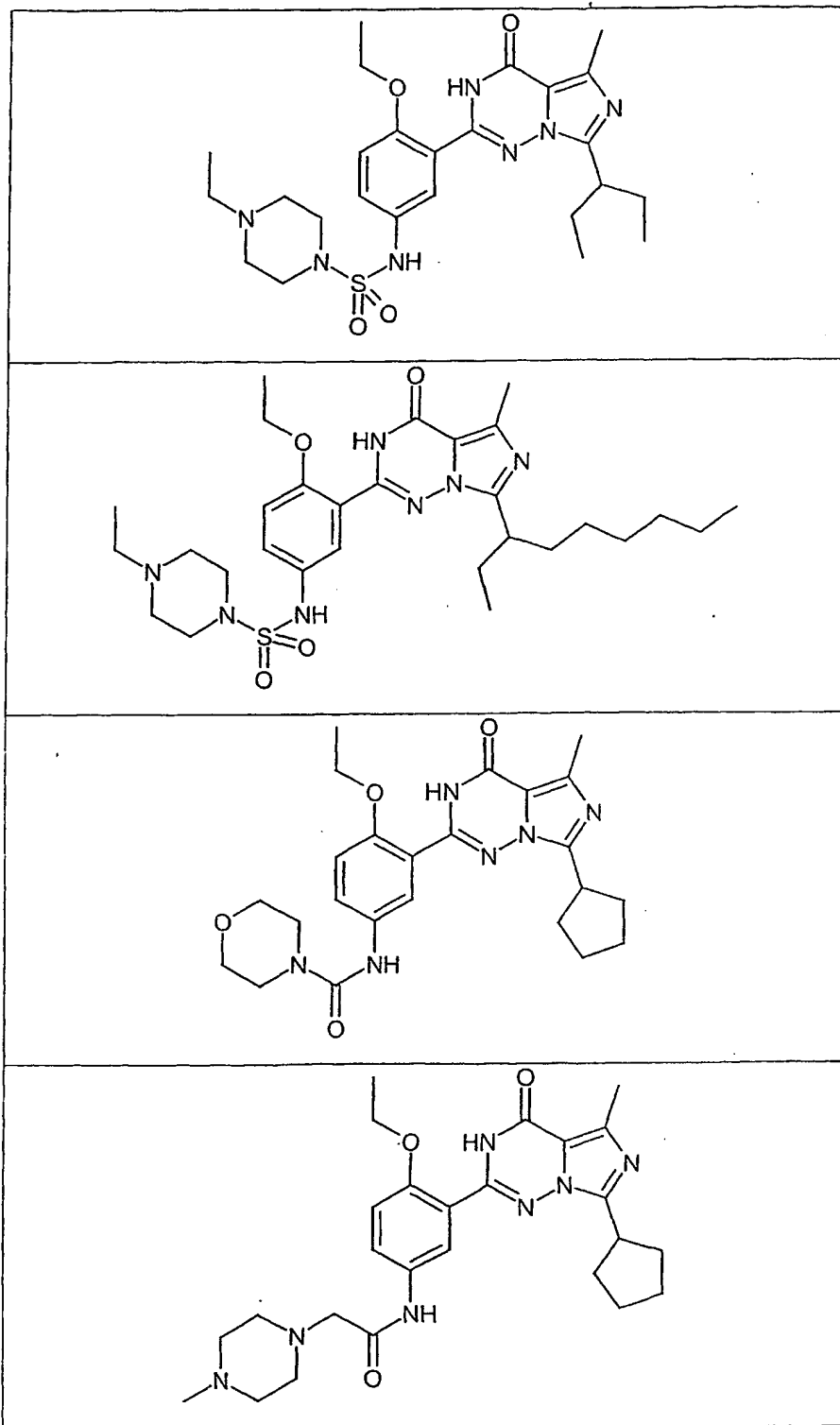
$R^{48}$  is phenyl which is optionally substituted by chlorine, trifluoromethyl or  $(C_1-C_4)$ -alkoxy,

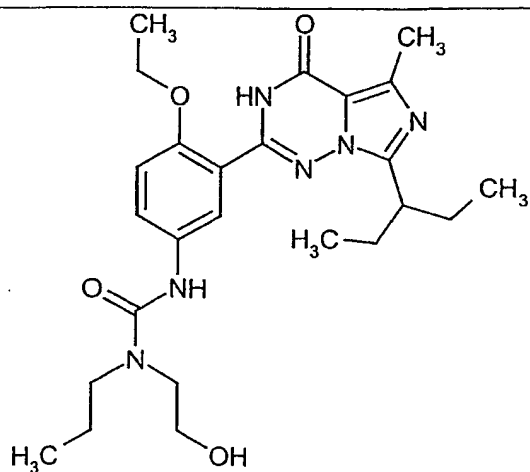
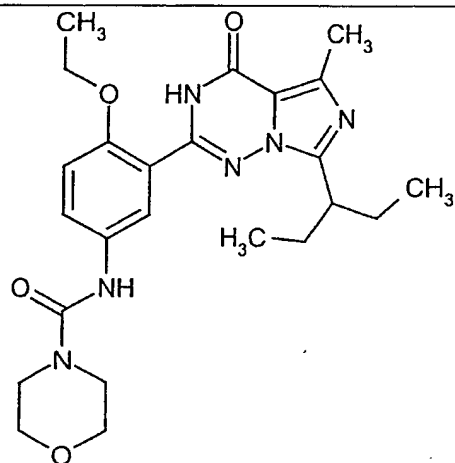
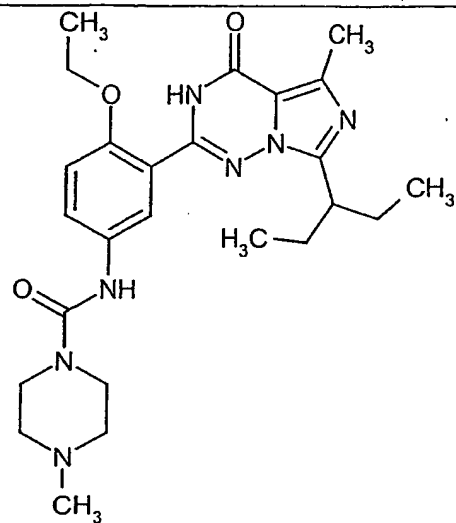
and the tautomers thereof, and the pharmaceutically acceptable salts, hydrates and prodrugs thereof.

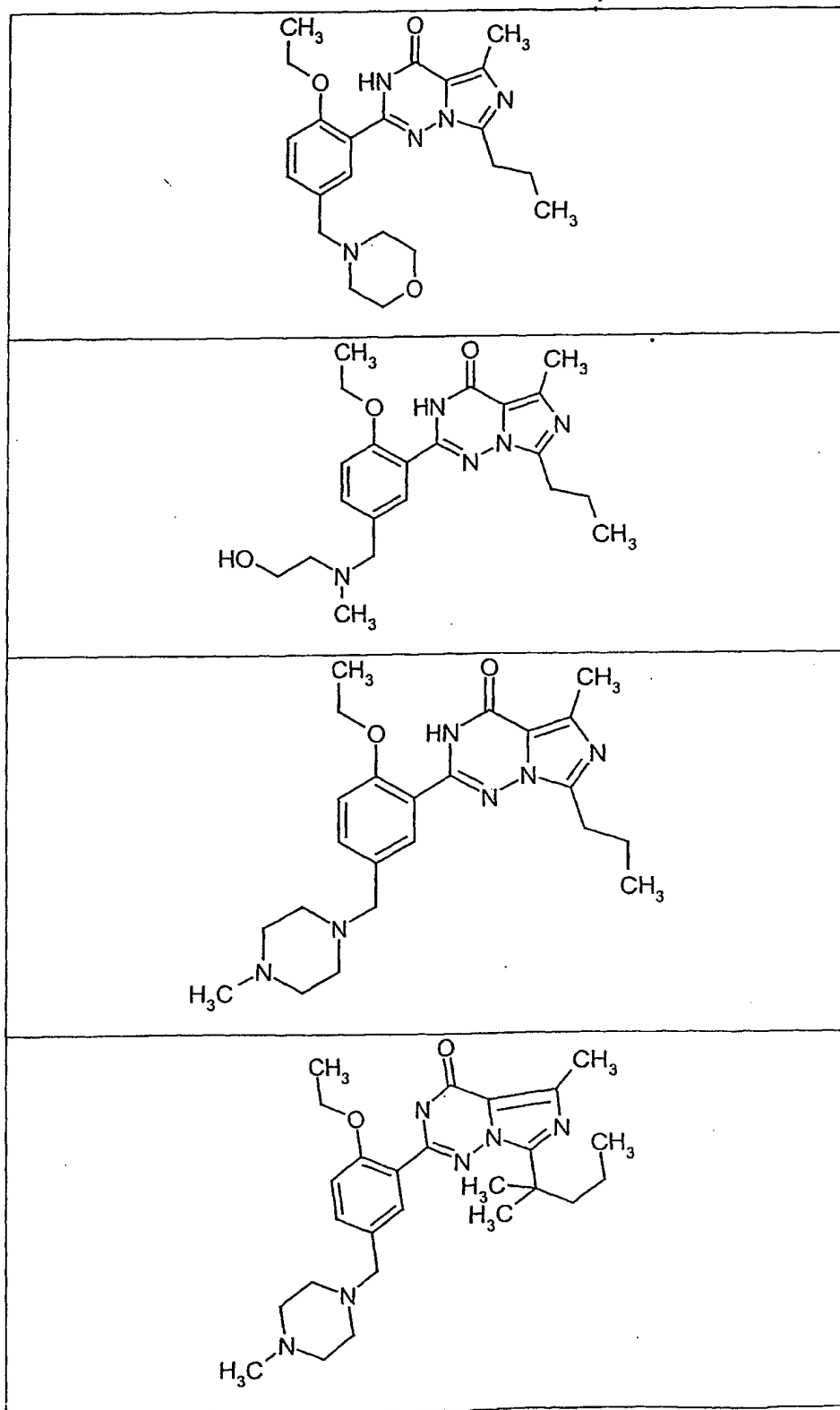
4. (Currently amended) The ~~use~~ method as claimed in claim 1 ~~of~~ wherein the compounds ~~having~~ has the following structures:

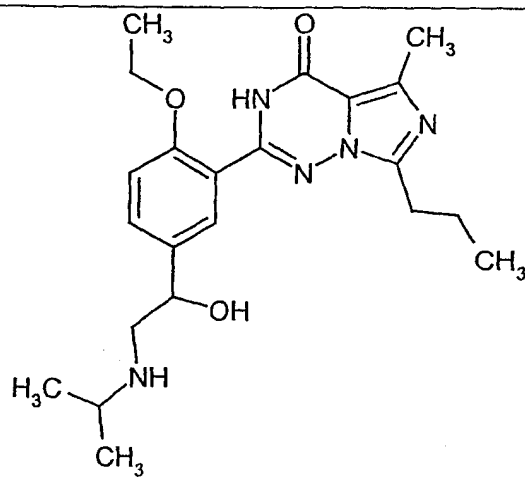
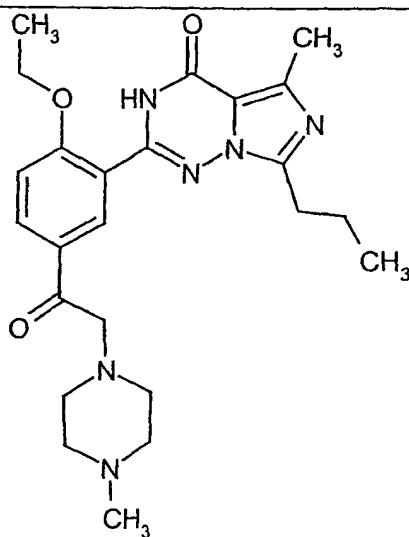
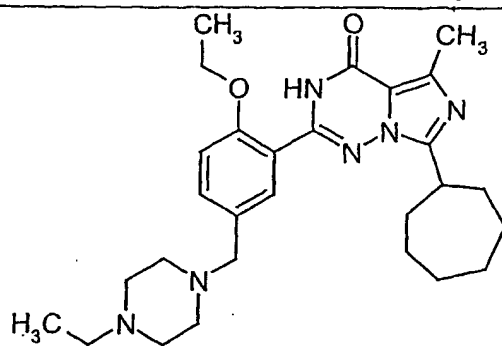


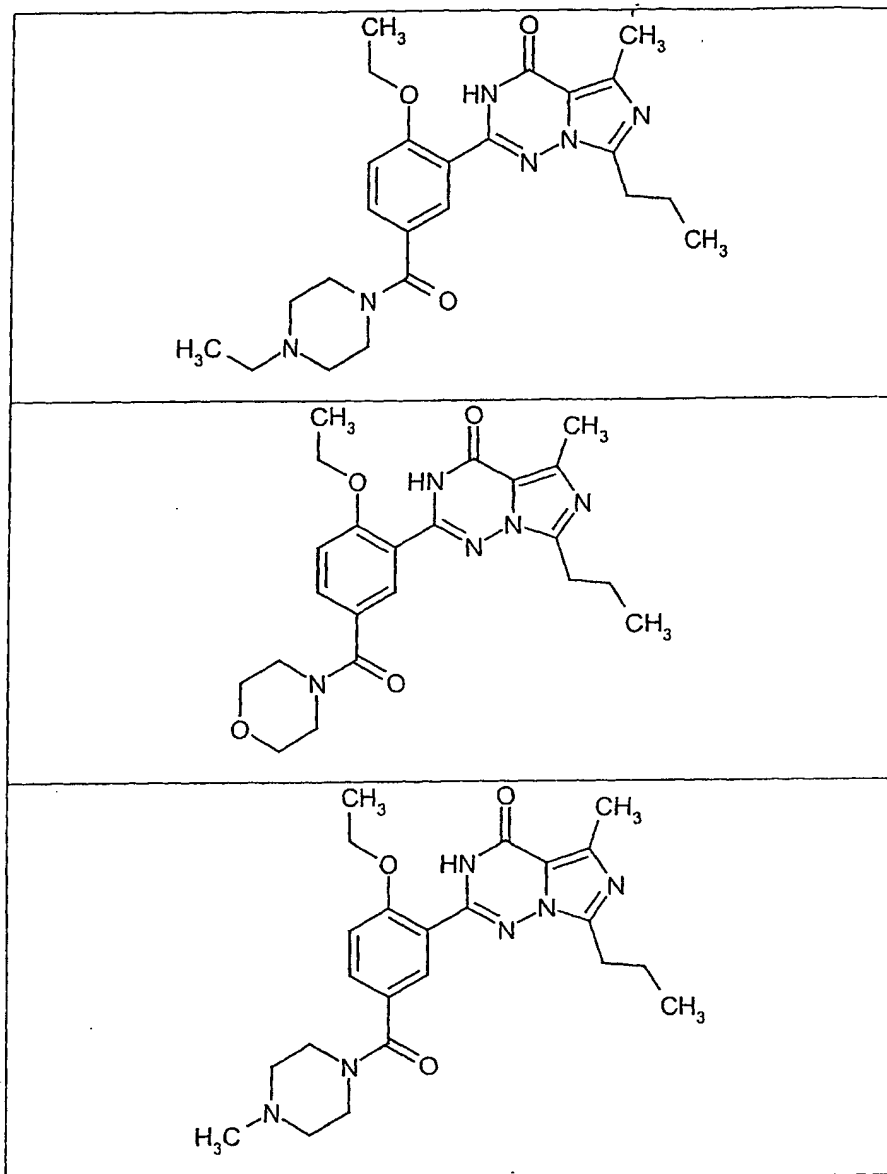












and the tautomers thereof, and the pharmaceutically acceptable salts, hydrates and prodtrugs thereof.

5. (Cancelled).
6. (Currently amended) ~~The use of compounds as defined in claims 1 to 4 for producing medicaments~~ A method for the treatment of diseases in which an improvement and/or cure of the pathological condition can be achieved by improving the microcirculation of a tissue which comprises a cGMP-metabolizing phosphodiesterase comprising administering to a subject an effective amount of a compound of any one of claims 1 to 4.
7. (Currently amended) ~~The use of compounds as defined in claims 1 to 4 for producing medicaments~~ A method for the treatment of and/or prophylaxis of coronary heart disease, heart failure, pulmonary hypertension, bladder disorders, prostate hyperplasia, nitrate-induced tolerance, ocular disorders, ~~such as glaucoma, for the treatment or prophylaxis of~~ central retinal or posterior ciliary arterial occlusion, central retinal venous occlusion, optic neuropathy, ~~such as~~ anterior ischemic optic neuropathy, ~~and~~ glaucomatous optic neuropathy, ~~and of~~ macular degeneration, diabetes, ~~for the treatment of~~ disorders of the peristalsis of stomach and esophagus, female infertility, premature labor, preeclampsia, alopecia, psoriasis, ~~the~~ renal syndrome, cystic fibrosis, and cancer, for improving perception, for improving concentration, for improving learning and/or memory comprising administering to a subject an effective amount of a compound of any one of claims 1 to 4.